MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

BDS4614 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

3 JUNE 2016
3.00 p.m – 6.00 p.m
(3 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **SIX (6)** printed pages including cover page.
2. Answer **ALL FIVE (5)** questions.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 (20 MARKS)

Barbour Brand produces three models of footwear that are made from rubber, plastic and leather. The following table summarizes the data of the situation:

Resource	*Unit resource requirements*			*Maximum availability (units)*
	Model X (units)	*Model Y (units)*	*Model Z (units)*	
Rubber	3	2	4	653
Plastic	1	3	0	278
Leather	0	0	1	555
Unit price (RM)	80	45	120	

The company would like to determine the optimal product mix in order to maximize its total revenue. Let x_1, x_2 and x_3 be the amounts produced of Models X, Y and Z respectively.

(a) Formulate the problem as a linear programming problem?

(4 marks)

The EXCEL output is as follows:

Variable	Value	Reduced Cost	Original value	Lower Bound	Upper Bound
x_1	500	0	80	66.67	100
x_2	250	0	45	37.5	53.6
x_3	382	0	120	88	138
Constraint	Dual Value	Slack/surplus	Original value	Lower Bound	Upper Bound
Rubber	0	350	653	550	789
Plastic	5.25	0	278	260	350
Leather	12.36	0	555	400	infinity

(b) How many units of each model should be produced in order to obtain maximum revenue? What is the maximum revenue?

(4 marks)

(c) State the status of each resource namely binding or non-binding resource. Determine how many units of each resource are unused?

(4 marks)

(d) Is it worthwhile to increase an additional unit of Leather at RM 12? Explain.

(2 marks)

(e) If the right – hand side of constraint 2 were increased by 35 units, how much would the profit increase?

(3 marks)

Continued...

(f) What is the range of optimality for objective function coefficients of x_1, x_2 and x_3 ? **(3 marks)**

QUESTION 2 (20 MARKS)

Mancho Company manufactures electric fans at three factories to meet the demand of three distributors. The production capacity, the demand of the distributors and the transportation cost per unit in RM from each factory to each distributor are shown in the following tables:

	Distributors			
Factories	D	E	F	Supply
A	5	8	6	70
B	10	9	11	100
C	7	6	8	30
Demand	50	90	60	

Find an initial solution using Northwest Corner Method and determine the optimal distribution plan that minimizes the total distribution costs.

(20 marks)

Continued...

QUESTION 3 (20 MARKS)

A project has the following activities, precedence relationships and activity times which are given in the following table:

Activity	*Immediate Predecessors*	*Duration (Weeks)*		
		Shortest	*Most Likely*	*Longest*
A	-	7	9	11
B	A	5	7	9
C	A	2	3	4
D	B	9	11	13
E	C,D	7	9	11
F	E	9	10	11
G	F	6	7	8
H	F	12	13	14
I	G,H	4	5	6

(a) Determine the expected duration for each activity.

(3 marks)

(b) Identify the critical path and the expected completion time of the project. Determine the earliest start time, latest start time, earliest finish time, latest finish time and slack time.

(17 marks)

Continued...

QUESTION 4 (20 MARKS)

JoYo Company is considering several alternative development projects. The financial success of these projects depends on the interest rate movements in the next four years. The projects and their four year financial returns (RM'000) with the possible given interest rates (decline, remain stable or increase) are shown in the table below:

Project	Interest Rate, Returns (RM'000)		
	Decline	Stable	Increase
Shop	36	22	15
Mall	53	39	25
Condominium	35	17	4
Warehouse	16	15	10
Probability	0.4	0.4	0.2

(a) What is the best decision based on optimistic criterion?

(2 marks)

(b) Select the best pessimistic alternative.

(2 marks)

(c) Determine the best strategy using Expected Monetary Value (EMV).

(6 marks)

(d) Compute the criterion of realism decision and use $\alpha = 0.8$.

(4 marks)

(e) Find the best alternative if they wanted to minimize their expected loss.

(6 marks)

Continued...

QUESTION 5 (20 MARKS)

TK Trading operates 300 days a year. The annual demand for water filters are 900 units. It costs RM 20 to place an order and the holding cost is RM 10 per unit. It takes 3 days for an order to arrive from the supplier. The supplier has informed TK Trading that the holding cost per unit would drop from RM 10 to RM 7.25 if they purchase the filters in 300 units. However the lead time would increase to 5 days for this large quantity.

(a) What is the economic order quantity (EOQ)?

(4 marks)

(b) Determine the number of orders that will be made in a year.

(3 marks)

(c) Calculate the annual inventory cost.

(3 marks)

(d) What is the Reorder Point (ROP)? What is the time between orders?

(3 marks)

(e) If TK Trading purchased the filters of 300 units, what is the new ROP?

(3 marks)

(f) What is the annual inventory cost if TK Trading purchased in lots of 300 units? Should TK Trading order in lots of 300 units or EOQ? **(4 marks)**

End of Page